



# **Report to House Appropriations Committee on the Leaking Underground Storage Tanks Program**



**REPORT TO HOUSE APPROPRIATIONS COMMITTEE ON  
THE LEAKING UNDERGROUND STORAGE TANKS PROGRAM**

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## **EXECUTIVE SUMMARY**

This report provides an overview of the regulatory program including key aspects of implementation, cleanup costs and EPA's efforts to control them, and program needs and EPA's plans to address them.

### **Overview of Underground Storage Tanks and Nature of the Problem**

As of 1992, about 1.6 million petroleum underground storage tanks (USTs) and 37,300 hazardous substance USTs are subject to the federal regulations. Many USTs are used for retail purposes or for private use. Large petroleum companies, mid-size marketers, and small "Mom and Pop" gasoline service stations and convenience stores own motor fuel tanks. Other facilities that use USTs include public facilities and service sectors such as airports, schools, and transit authorities.

When petroleum or hazardous substance tanks leak, the products they release can contaminate surface and ground water, cause fires and explosions, and expose people to substances causing adverse health effects (e.g., benzene, a carcinogen). Corrosion of tanks and piping, improper system installation, spills and overfills during product delivery, and piping failures can cause releases.

Confirmed releases are being reported to implementing agencies at a rate of about 1,000 per week; at the state level, individual site managers are overseeing up to 400 cases at a time. The number of releases is expected to level off at about 320,000 releases during fiscal year 1995. (EPA estimates that about twenty percent of the regulated universe of 1.6 million USTs is leaking.) With current resources, states and responsible parties are initiating cleanups at about 36,000 sites per year and completing cleanups at about 16,000 sites per year.

State or local agency cleanup program staff oversee increasing caseloads of active cleanups, usually conducted by responsible parties. (Responsible parties conduct approximately 97 percent of all leaking underground storage tank (LUST) cleanups.) State personnel face increasing backlogs of sites awaiting a response and additional demands for guidance and oversight.

### **The Federal Regulations**

The regulations have three major components: Technical requirements for new and existing tanks and piping, state program approval (SPA) requirements, and financial responsibility requirements for UST owners and operators.

On September 23, 1988, EPA published its final technical and state approval regulations for USTs containing regulated substances. EPA designed the technical regulations to reduce the chance of releases from UST systems, to increase the likelihood of finding releases quickly when they do occur, and to secure prompt cleanup. The state program approval requirements specify program components states must have to obtain state program approval to enable them to operate in lieu of the federal program. As of December 1992, EPA approved 10 state programs. Twenty-two additional states submitted completed or nearly complete SPA applications. Forty-seven states and territories have technical regulations for USTs.

The financial responsibility regulations, published on October 26, 1988, require that UST owners or operators demonstrate the ability to pay the costs of corrective action and compensation of third parties for injuries or damages resulting from the release of petroleum from USTs.

## **OUST's Approach to Implementing the UST Program**

In managing the national program, the Office of Underground Storage Tanks (OUST) has adopted a decentralized model that empowers state and local programs. Under this model, the state operates under a signed agreement with EPA to implement and manage provisions of the national UST program at the state level. The national program provides technical support and assistance to states in streamlining their cleanup and prevention programs. This arrangement allows states to run programs that are tailored to the needs and demands of their own regulated communities, while EPA offers implementation support to states, including financial support.

The LUST Trust Fund was created to help pay for the cleanup of petroleum releases from USTs where this cleanup cannot or will not be accomplished by the owner or operator or to oversee responsible party cleanups. The Trust Fund has collected about \$900 million as of the end of Fiscal Year 1992. Approximately \$400 million has been appropriated to EPA through Fiscal Year 1993.

### **Costs of UST Cleanups and Efforts to Control Costs**

Costs of remediating or cleaning up releases can vary greatly and can be influenced by several factors including the volume of the release, the extent of contamination, geologic characteristics, level of cleanup required, and reporting requirements of the states. Prompt responses to releases can help to reduce cleanup costs. In cases where groundwater is affected, the costs of cleaning up releases are increased significantly.

Sample cost data from states are provided to offer a snapshot of the actual costs being incurred for cleaning up UST releases. Actual costs of cleanup are variable and still somewhat unpredictable. Costs of remediating LUSTs can generally be grouped into two cost classes--sites with soil contamination and sites with groundwater contamination. The costs for remediating sites with soil contamination generally vary between \$10,000 and \$125,000. Costs for remediating sites with groundwater contamination can range from \$100,000 to over \$1 million depending on the extent of contamination.

Because of the high costs of cleanup, limited state and federal funds, and concern about small owners and operators having the funds to pay for cleanup, it is essential to identify opportunities for reducing costs and streamlining corrective action processes. One of OUST's top priorities is assisting in the streamlining of corrective action programs and promoting innovative site investigation and cleanup technologies.

A few state programs have worked aggressively at streamlining for several years and have demonstrated that it is possible to provide effective oversight at a large number of sites while reducing paperwork. Some programs are making promising revisions to their corrective action processes that allow simple cleanups at low-risk sites to proceed more quickly with better guidance and reduced oversight. Many states have reaped benefits from communicating and working more effectively with their "suppliers and customers" -- contractors, consultants, tank owners and operators, and the general public. However, even in the most advanced programs, additional improvements are possible and necessary in order to meet the program's goals with the resources that are likely to be available.

# **REPORT TO HOUSE APPROPRIATIONS COMMITTEE ON THE LEAKING UNDERGROUND STORAGE TANKS PROGRAM**

This report responds directly to the Committee's request to provide information on the overall underground storage tank (UST) program with emphases on the extent of the leaking underground storage tank (LUST) problem, the status of EPA's efforts, and the costs involved in remediating the problem. It provides an overview of the regulatory program including key aspects of implementation, cleanup costs and EPA's efforts to control them. Finally, the report discusses program needs and EPA's plans to address them.

## **INTRODUCTION TO USTs AND EPA's REGULATORY PROGRAM**

As of 1992, about 1.6 million petroleum USTs and 37,300 hazardous substance USTs are subject to the federal regulations. Many USTs are used for retail purposes or for private use. Motor fuel tanks used for retail purposes are owned by large petroleum companies, mid-size marketers, and small "Mom and Pop" gasoline service stations and convenience stores. Other facilities that use USTs (but do not sell petroleum products) include public facilities and service sectors such as airports, schools, and transit authorities. The large number and wide variety of facilities with USTs make the regulation of USTs an especially challenging task.

When petroleum or hazardous substance tanks leak, the products they release can contaminate surface and ground water, cause fires and explosions, and expose people to substances causing adverse health effects (e.g., benzene, a carcinogen).

For regulatory purposes, EPA defines an UST as any tank, including underground piping connected to the tank, that contains a regulated substance and the volume of which is at least 10 percent underground. The regulations apply to USTs which are storing petroleum products and hazardous substances (excluding any substance regulated as a hazardous waste under Subtitle C of the Resource Conservation and Recovery Act (RCRA)). The following are not covered by the regulations: Farm and residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes; tanks used for storing heating oil for consumptive use on the premises where stored; tanks stored on or above the floor of underground areas (e.g., basements, tunnels); septic tanks; systems for collecting stormwater or wastewater; flow-through process tanks; emergency spill and overfill tanks that are expeditiously emptied after use; and tanks holding 110 gallons or less.

### **The Causes Of Releases**

According to a study conducted for EPA in 1987, the four major causes of UST releases are corrosion of tanks and piping, improper system installation, spills and overfills during product delivery, and piping failures. Before the regulations were promulgated in 1988, most installed underground storage tanks and piping were constructed of bare steel. When it is buried in the ground, unprotected steel can be destroyed by external and internal corrosion, resulting in leaks. Leaks are also often the result of installation mistakes, including improperly anchoring the tank which causes the tank to shift or rupture, or inadequately paving over the tank's surface leading to damage from vehicular traffic.

Spills can occur during product delivery if the delivery truck's hose is disconnected from the tank before it is shut off or drained. Overfills occur when a tank's capacity is exceeded. Most leaks, however, result from piping failure. The walls of pipes are smaller and less sturdy than are the walls of tanks, and pipes are assembled in the field. Pipes suffer much more than do tanks from excessive surface loads, the stress of underground movement, corrosion, and improper installation.

### **Portraying The Status Of Corrective Action**

Exhibit 1 shows the cumulative number of confirmed releases, cleanups initiated, and cleanups completed from fiscal year 1990 through fiscal year 1992. As of fourth quarter fiscal year 1992, almost 184,000 releases were confirmed, 129,000 cleanups were initiated, and 55,000 cleanups were completed by responsible parties or state and local implementing agencies. While the program has been successful at initiating cleanups at sites with confirmed releases (70 percent), the number of confirmed releases is growing at a rapid rate and creating a backlog of sites that need to be addressed. Although a greater percentage of cleanups has been completed over the last several years (30 percent of confirmed releases), the total universe of sites continues to grow thereby also contributing to the backlog of sites which require further remediation. Exhibit 2 illustrates the growth in the cumulative number of confirmed releases, cleanups initiated, and cleanups completed from fiscal year 1988 through fiscal year 1992.

Releases have been reported at an average rate of about 1,000 per week over the last two years. The number of confirmed releases is expected to grow at a rate of about 50,000 releases per year until it levels off at about 320,000 releases during fiscal year 1995. (EPA estimates that about twenty percent of the regulated universe of 1.6 million USTs is leaking.) The rate of confirmed releases is expected to slow after December 22, 1993, the date by which all UST owners and operators must have installed release detection systems.

The states and responsible parties are currently initiating cleanups at about 36,000 sites per year and completing cleanups at about 16,000 sites per year. State or local agency cleanup program staff oversee increasing caseloads of active cleanups, usually conducted by responsible parties. (Responsible parties conduct approximately 97 percent of all LUST cleanups.) State personnel face increasing backlogs of sites awaiting a response and additional demands for guidance and oversight. Delays in approving site cleanup work can substantially increase the costs of cleanups, since contamination may spread in the interim. Added delays can also disrupt businesses for longer than necessary, making cleanups more burdensome for many owners and operators, especially small businesses.

### **The Technical Requirements Of The UST Program**

On September 23, 1988, EPA published its final technical and state program approval regulations for USTs containing regulated substances. EPA's Office of Underground Storage Tanks (OUST) manages the program to implement the regulations. The regulations have three major components: Technical requirements for new and existing tanks and piping, financial responsibility requirements for UST owners and operators, and state program approval requirements.



EPA designed the technical regulations for USTs to reduce the chance of releases from UST systems, to increase the likelihood of finding releases quickly when they do occur, and to secure prompt cleanup. OUST's philosophy is that good tank management practices are the best way to prevent leaks and to detect leaks early and initiate cleanup before they spread and cause extensive damage. Exhibit 2 also shows that an increasing number of confirmed releases (i.e., releases from LUSTs that have been reported to and confirmed by the state or local implementing agency) have been reported.

### **Leak Prevention**

EPA promulgated requirements in four important categories for managing UST systems designed to prevent releases: (1) Tank design and installation, (2) release detection, (3) corrosion protection, and (4) spill and overfill control. All systems installed after December 22, 1988 must meet federal requirements immediately. However, because of implementation concerns stemming from the large number of UST owners and operators, EPA phased in requirements for release detection on UST systems existing at the time the regulations were promulgated. The requirements are phased in according to the age of the tank; older tanks, which are more likely to leak, are required to have release detection systems first.

By December 22, 1993, all owners must utilize an accepted method of release detection on all existing systems. Additionally, owners of existing tank systems have until December 22, 1998 to upgrade their tanks by installing internal linings and/or cathodic protection, or replace them with new tanks made of approved materials such as fiberglass-reinforced plastic. These existing tank systems must also be retrofitted with spill and overfill devices.

Prior to promulgation of the federal regulations for USTs, the majority of tanks were made of bare steel and were not equipped with release detection devices. Since promulgation of the regulations, approximately 480,000 USTs have been closed. Many of these closures represent the retirement of existing unprotected tank systems.

### **Corrective Action**

Owners and operators of UST systems containing petroleum or hazardous substances must respond to confirmed releases. This requirement includes notifying the appropriate agencies of the release within a specified period of time; taking immediate action to prevent any further release (e.g., removing product from the UST system); monitoring and preventing the spread of contamination into the soil and/or groundwater; assembling detailed information about the site and the nature of the release; removing free product to the maximum extent practicable; investigating soil and groundwater contamination; and, in appropriate cases, outlining and implementing a detailed corrective action plan for remediation.

### **The Financial Responsibility Requirements Of The UST Program**

The financial responsibility regulations, published on October 26, 1988, require that UST owners or operators demonstrate the ability to pay the costs of corrective action and compensation.

third parties for injuries or damages resulting from the release of petroleum from USTs. EPA requires all owners or operators of petroleum USTs to maintain an annual aggregate of financial assurance of \$1 million or \$2 million, depending on the number of USTs owned. EPA adopted a phased-in schedule that requires large owners and operators with greater financial resources to comply with the requirements before smaller businesses and municipalities. In general, small owners and operators are defined as marketers with fewer than 12 tanks and large owners and operators are defined as marketers with greater than 13 tanks. Options available to owners and operators include: Purchasing commercial environmental impairment liability insurance; demonstrating self-insurance; obtaining guarantees, surety bonds, or letters of credit; placing the required amount into a trust fund administered by a third party; or relying on coverage provided by a state assurance fund.

The experience of state and local agencies with UST programs shows that large businesses that own USTs are generally willing and have already begun to comply with UST regulations. However, small owners, with more limited resources, often need financial assistance to comply. The cost of obtaining financial assurance coverage is not very high, but the costs that these firms must incur to be eligible for financial assurance (e.g., costs for installing release detection devices, replacing or upgrading tanks) are substantial relative to the sales, profits, and assets of these smaller firms.

Forty-three states have developed state assurance funds to reduce the economic hardship of compliance with the financial responsibility requirements and to help pay for the costs of cleanup. Twenty-nine state assurance funds have been approved by EPA to serve as financial responsibility mechanisms. In some cases these funds may only supply a portion of the financial assurance required. For example, some state funds cover corrective action but not third-party liability costs. In these cases, state funds may need to be used in combination with other mechanisms to meet the requirements of the regulations.

### **State Program Approval Requirements Of The UST Program**

A crucial component of the federal UST program is the approval of state programs. The large size of the regulated universe necessitated that EPA work with states to encourage the development of state and local UST programs. The national UST program is primarily a network of local and state programs, with EPA providing leadership and assistance and, when necessary, enforcement support. Once state programs are approved, they operate in lieu of the federal program, thus eliminating duplication of regulatory effort. To obtain state program approval (SPA), states must have programs at least as broad in scope as the federal program, have technical requirements that are "no less stringent" than the federal requirements, and provide adequate enforcement of compliance.

Forty-seven states and territories have technical regulations for USTs. In general, states have greater flexibility in designing their programs than that allowed under the federal statute. For example, many states—unlike EPA—have the authority to regulate distributors of petroleum products and can prohibit them from delivering product to unregistered or unlicensed tanks. As of December 1992, EPA approved 10 state programs. Twenty-two additional states submitted completed or nearly complete SPA applications. Exhibit 3 displays the status of state program approval.

## **OUST's Approach To Implementing The UST Program**

In managing the national UST program, OUST has adopted a decentralized model that empowers state and local programs. Under this model, the state operates under a signed agreement with EPA to implement and manage provisions of the national UST program at the state level. EPA regional offices serve as liaisons between EPA headquarters and states. The regions identify, analyze, and address appropriate state needs. The national UST program provides technical support and assistance to states in streamlining their cleanup and prevention programs. This arrangement allows states to run programs that are tailored to the needs and demands of their own regulated communities, while EPA continues to offer implementation support to states, including financial support.

In implementing the national UST program, OUST provides support to states in establishing compliance monitoring and enforcement programs, funding state program development, paying for cleanups that cannot be paid for by a responsible party, developing mechanisms to assist owners and operators in meeting the financial responsibility requirements, and helping improve the cleanup process. It is essential for the UST program to focus on prevention activities to prevent future releases from occurring and to detect ongoing releases as early as possible. Detecting releases at an early stage can minimize the spread of contamination, allow for earlier initiation and completion of cleanups, and reduce the cost of cleanups.

### **Establishing Compliance Monitoring And Enforcement Programs**

Because states and local implementing agencies have the lead in enforcing against suspected violators of the UST regulations, OUST initially focused on developing adequate state enforcement capability. EPA conducts some federal enforcement actions to supplement state activity. Because the UST regulated community is large, diverse, and includes numerous small businesses, OUST also believed that innovative outreach materials should be used to promote compliance by the regulated community. OUST has developed a variety of products (e.g., brochures, videotapes, guidance manuals, and tool kits) for a variety of audiences (e.g., owners and operators, state program staff, contractors, and consultants) on a variety of topics (e.g., tank installation, closure, release detection, and corrective action).

**Federal Release Detection Initiative.** In June 1990, OUST initiated a federal release detection enforcement initiative to provide assistance to states and to emphasize the seriousness and importance of the release detection requirements. States have successfully used mailings to leverage their resources and make initial determinations regarding compliance with the release detection requirements. The mailings remind the owners and operators of the release detection requirements, request that they complete a self-certification form stating that they are in compliance, and ask that they submit evidence to demonstrate compliance. The mailings enable state regulators to more easily detect non-compliers.

**Streamlined Enforcement.** While frequent inspections and formal enforcement actions against violators are effective in encouraging compliance among the regulated community, successful exercise of formal enforcement authority requires more staff time than many developing state programs have available. OUST, therefore, is exploring the possibility of adapting expedited or streamlined enforcement concepts to the UST enforcement program as a supplement to more traditional procedures.

One example of an expedited enforcement technique adapted by OUST is the field citation, a "traffic ticket"-styled settlement that is issued on-site by inspectors and that generally carries a penalty. This technique often achieves a higher rate of compliance using fewer resources than do more traditional enforcement methods. To assist states in developing expedited enforcement programs, OUST has developed guidance manuals that outline the steps and procedures of implementing a field citation program.

OUST pioneered the use of field citations by federal inspectors in order to assist states in maximizing their enforcement resources. Federal inspectors in Regions 1, 4, 6, 8, and 10 have effectively used field citations as a tool to address certain technical violations that states were not actively enforcing because of resource constraints or limitations in authorities.

### **Providing Federal Funds To States**

EPA provides funds to states in two forms: UST Program Grants and Leaking Underground Storage Tank (LUST) Trust Fund Cooperative Agreements. UST grant money, which is appropriated by Congress and provided for under the Hazardous and Solid Waste Amendments, is intended as seed money for states to develop and implement state regulatory programs. Grants ranging from \$125,000 to \$180,000 are provided to each state and territory annually. These funds can be used for developing program legislation, accumulating and organizing resources, developing state program approval applications, conducting outreach efforts to promote regulatory compliance, monitoring compliance, and conducting enforcement activities.

The larger of the two sources of federal funds provided to states and territories is the LUST Trust Fund Cooperative Agreement. The Superfund Amendments and Reauthorization Act of 1986 amended Subtitle I of the Resource Conservation and Recovery Act to create the LUST Trust Fund. Exhibit 4 compares the level of cumulative Trust Fund appropriations to EPA to cumulative funds collected in the LUST Trust Fund. Approximately \$400 million has been appropriated to EPA through fiscal year 1993. As of the end of fiscal year 1992, the Trust Fund has collected about \$900 million.

The purpose of the Trust Fund is to ensure protection of human health and the environment by helping to pay for the cleanup of petroleum releases from USTs where this cleanup cannot or will not be accomplished by the owner or operator or paying for the oversight of responsible party cleanups. To receive Trust Fund monies, states must enter into cooperative agreements with EPA that specify the actions states agree to take in return for receiving these monies. The actions that states generally conduct include identifying suspected releases, developing and enforcing corrective action orders, overseeing responsible party cleanups, and conducting corrective actions. All states but one, Florida, have signed cooperative agreements. Florida has its own \$160 million cleanup fund.

### **Developing State Assurance Programs For Owners And Operators**

OUST's early efforts regarding implementation of the financial responsibility requirements USTs under Subtitle I included estimating the costs and benefits of the financial responsibility regulations, assessing the viability of alternative financial assurance mechanisms, monitoring the

dissolved product) would be required at only a fifth of all sites and would cost an average of \$168,750. The costs revealed by this model appear now to be below market costs of actual cleanups. This may be due to the assumption that only one-fifth of the sites would require extensive groundwater remediation, the most expensive component of remediation.

### **Factors Influencing Cost Data**

OUST does not require the states to submit cost data to EPA because OUST wants the states to spend their limited resources on designing corrective action programs that are the most efficient for local needs and conditions and on overseeing or conducting site cleanups. The Agency does not want the states to divert funds away from cleanup to cost tracking systems. Furthermore, 97 percent of the cleanups are conducted by responsible parties, not by the state programs, making data collection difficult. However, states with assurance funds have started to collect cost data because these states are responsible for tracking their own funds and are concerned about the costs of cleanups.

For the purpose of this report, OUST collected limited data on average costs from a few states. The states with assurance funds are cautious about releasing cost data because they are concerned that owners/operators and contractors will obtain state data on maximum allowable costs and will charge the fund these maximum costs, even if the actual cleanup costs were less. Because of this concern, we have not identified states by name. It was difficult to obtain comparable data on UST cleanup costs because the data came from several states, each with its own method of tracking costs.

Other factors that make drawing comparisons among the states difficult are as follows.

- Selectivity bias. Sites for which cost data are available may represent only the highest priority sites, or they may only represent sites that could be cleaned up relatively quickly.
- Unclosed site bias. Some sites may not have been fully addressed, and cost data may fail to include all past and future remediation costs.
- Unclear deductible status. State assurance fund cost data may include only costs above deductible amounts.

Notwithstanding, sample cost data from states and other sources do offer a snapshot of the actual costs being incurred for cleaning up UST releases.

### **Examples Of Costs**

Based on survey data submitted by the American Petroleum Institute (API) from 23 sites in 12 states, OUST found cleanup costs to average about \$370,000, with 23 percent of the total costs being related to the site assessment phase and 62 percent being related to removing floating and dissolved contamination and cleaning up soil. The remaining 15 percent of the costs were distributed among closure, post-closure monitoring, and contractor oversight. Although the average cost of addressing these sites appears high, the API sample consisted of expensive releases that were cleaned up prior to

recent technology improvements and the development of state programs. The majority of the sites were cleaned up in the late 1980's and had groundwater contamination.

Results from a survey conducted by the Petroleum Marketers Association of America found per-site costs for performing cleanups in 1991 averaging slightly over \$57,000. A 1991 study conducted by the University of Tennessee cited average costs for different cleanup scenarios: \$35,000 for simple soil contamination; \$110,000 for complex soil contamination; \$340,000 for simple groundwater contamination; and \$500,000 for complex groundwater contamination. In addition, the University of Tennessee cited the average cost for an environmental assessment at \$15,000.

In one northeastern state, average cleanup costs over the last couple of years from the state fund were \$60,000 per site. In one western state, data for 20 sites reported to have been completed (but some of which may require additional work) indicated average costs of about \$126,000. Almost all of these cleanups involved very extensive soil removal and treatment.

In one southern state, the average allowable cost per closed claim (based on data from 153 sites) is almost \$51,000. However, these costs refer only to allowable claim amount and, therefore, do not reflect the total amount of funds spent at a site. In addition, the data indicated that additional work may be required. Groundwater treatment costs will probably account for the majority of the remaining costs.

As these sample data show, actual costs of cleanup are variable and still somewhat unpredictable. In addition, average cleanup costs are misleading; the costs of cleanup are probably more appropriately considered within a range of costs. Costs of remediating LUSTs can generally be grouped into two cost classes—sites with soil contamination and sites with groundwater contamination. The costs for remediating sites with soil contamination generally vary between \$10,000 and \$125,000. Costs for remediating sites with groundwater contamination can range from \$100,000 to over \$1 million depending on the extent of contamination. For example, if a sole-source drinking water supply is contaminated, the cleanup would be very extensive and quite costly.

### **Efforts To Control Costs**

Because of the high costs of cleanup, limited state and federal funds, and concern about small owners and operators having the funds to pay for cleanup, it is essential to identify opportunities for reducing costs and streamlining corrective action processes. One of OUST's top priorities is assisting in the streamlining of corrective action programs and promoting innovative site investigation and cleanup technologies. The long-term results should be faster, more protective, and lower cost cleanups, as well as reduced cleanup backlogs and lessened adverse economic impacts. To demonstrate the Agency's commitment towards these goals, OUST created a financial incentive for states in the national UST program to initiate and complete more cleanups. EPA rewards states that have a higher percentage of cleanups initiated and cleanups completed with additional Trust Fund money.

availability and cost of private insurance and the cost of cleanups, and developing alternative mechanisms, particularly for local governments, to demonstrate financial responsibility.

As discussed earlier, many states chose to develop state assurance funds to assist owners and operators in complying with the financial responsibility requirements. OUST has provided assistance by developing guidance materials on state assurance funds and working with state fund administrators. Last year, OUST and the South Dakota Petroleum Release Compensation Fund co-sponsored the first national conference for underground storage tank State Fund Administrators. Representatives from 46 states attended sessions on a variety of topics including controlling administrative costs of cleanups, evaluating environmental claims, state cleanup standards, projecting fund demands, and brainstorming solutions to common problems affecting administrators. In June 1993, OUST will co-sponsor a second conference with the Vermont program.

In addition, to help control the costs of UST cleanups and state fund administration, OUST developed guidance for state fund administrators on overseeing owners and operators during the cleanup process and disseminated information on innovative cost-control technologies. OUST also developed and distributed fact sheets for owners and operators on managing, hiring, and negotiating with cleanup contractors to reduce the costs of cleaning up LUSTs.

In addition to the 43 state assurance funds now available to assist owners and operators in cleaning up leaks, there are 17 state financial assistance programs that provide loans or grants to owners for tank upgrades and replacement.

### **Promoting Innovative Technologies**

The UST program is also working to promote the use of innovative site assessment and cleanup technologies in cooperative efforts with contractors, consultants, tank owners and operators, and state and local implementing agencies. Innovative technologies are defined as proven but not widely used site assessment and corrective action technologies. Even though some promising technologies—such as field measurement methods, air sparging, and soil vapor extraction—have proven advantageous in field applications and pilot projects in many states, they need to be used more widely. EPA is using a variety of research, training, demonstration, and outreach projects to increase the acceptance and use of technologies that can make cleanups faster, less costly, or more effective.

This fiscal year, OUST awarded Trust Fund money to each region to work with one of its states on expanding the use of innovative technologies. EPA's Region 5 office is working at several demonstration sites with British Petroleum Oil Company and Ohio on using soil vapor extraction, bioremediation, and other technologies. In addition, EPA's Regions 5 and 7 are working on developing a "train the trainer" course on soil vapor extraction, bioremediation, and low-temperature thermal desorption. OUST is promoting tools such as "Hyperventilate," a decision-making software tool for vacuum extraction, and "Lab-in-the-Bag," an inexpensive device that prepares samples for accurate measurement in the field.

Because the federal regulations do not require sequential data collection for confirming a release and determining the extent of contamination, these data can be collected simultaneously by using field measurement technologies. When used properly, technologies such as headspace analysis (e.g., "Lab-in-the-Bag") and soil vapor surveying can save time by allowing cleanups to begin with

waiting for the results of laboratory analysis. (Laboratory results are costly and can take two weeks to four months to obtain.) EPA's Region 4 office just completed a major initiative to educate state staff and contractors in all eight of its states on expedited site assessment technologies. Region 4 estimates that about 600 people received the training.

As training and demonstration projects progress, improved technologies are gaining wider acceptance. New Jersey has proposed a rule change that would allow site assessments based on field measurements at selected sites. An estimated two-thirds of the states are using innovative technologies at least on a pilot or field-testing basis. EPA will continue to provide assistance to stimulate widespread use of these cost- and time-saving technologies.

## **COSTS OF CLEANUP**

EPA and the states are concerned about the costs of cleaning up releases from USTs. This section identifies some of the factors that affect cleanup costs, presents EPA's estimates of costs of cleanup, provides examples of cleanup costs based on data from states and other sources, and outlines some of EPA's efforts to reduce costs associated with cleanups.

Costs of remediating or cleaning up releases can vary greatly and can be influenced by several factors. Prompt response to releases can help to reduce cleanup costs. In cases where groundwater is affected, the costs of cleaning up releases are increased significantly. Factors that influence cost include:

- Volume of release;
- Extent of soil and groundwater contamination;
- Geologic and hydrogeologic characteristics;
- Amount of time elapsed before initiating cleanup;
- Level of competition provided by the procurement process;
- Site assessment and cleanup technology chosen;
- Extent of sampling required;
- Levels of cleanup required;
- Burden of state procedures for qualifying for and obtaining funds from state assurance programs; and
- Reporting requirements of the state.

### **Initial Estimates Of Costs**

At the beginning of the UST program, at a time when few UST cleanups had been undertaken, EPA estimated corrective action costs for planning purposes and for inclusion in the Regulatory Impact Analysis for its technical standards. EPA estimated that a release of a typical size would cost about \$70,000 to address. (This estimate is a weighted average based on a combination of typical costs per cleanup activity and the likelihood that a given activity would be required.) The model made the following assumptions: A site assessment and contaminated soil excavation would be required at every site at a cost of \$20,000; the removal of a floating plume (i.e., free product) would occur at only half of all sites and would cost about \$33,000; and removal of a dispersed plume (i.e.,



## **Streamlining Corrective Action**

The burgeoning number of confirmed releases and the associated workload for state staff, make it essential for every state to implement streamlined procedures. On a national basis, about 1,000 releases are reported each week, and at the state level, individual site managers are overseeing up to 400 cases at a time. State regulations and procedures often do not allow responsible parties to proceed with a cleanup without the state's having approved a site-specific cleanup plan. Because state personnel have a backlog of plans to review, approval of the site-specific plan inevitably causes delays in initiating cleanups. In the meantime, contamination may be spreading at the site, thereby increasing the costs of remediation. In addition, a large number of the plans that the states receive from consultants, contractors, and tank owners and operators are deficient and unusable. It is a common occurrence for the same report to have to be submitted over and over again because it does not provide the information that is requested by the state or local implementing agency.

To address the large workload of state staff and problems with the regulated community, the national program is encouraging state managers and staff to use Total Quality Management (TQM) techniques to help them identify delays and opportunities for improvement; it is also providing assistance to states in modifying their procedures or improving their performance in the field. State efforts have included: Developing improved guidance materials, modifying review and oversight processes to reduce delays and paperwork, providing technical training, and holding seminars to improve communication between the states and the consultants and contractors who actually plan and conduct cleanups. Because many innovations and improvements are typically needed, the main objective of streamlining projects is to motivate, enable, and assist states in making additional improvements on their own.

To encourage state streamlining efforts formally, EPA's Office of Solid Waste and Emergency Response (OSWER) has released a policy directive entitled: *Streamlined Implementation of UST Corrective Action Requirements*. The Directive promotes streamlining; clearly outlines opportunities to carry out federal regulations in more flexible, efficient, and cost-effective ways; and provides specific ideas and examples of streamlining efforts. A number of the examples presented in the Directive are included below.

### **Streamlining Site Data**

Exhibit 5 displays the results of the corrective action streamlining efforts made by Minnesota. Minnesota has been streamlining its UST program aggressively for several years and has documented the most dramatic results. The national program is working toward similar accomplishments with other states. Minnesota's elapsed time for working on selected corrective action events has decreased between 50 to 80 percent. One way the state achieved these results was to develop standard petroleum tank release investigation forms that serve as a set of guidelines for both remedial investigation reports and corrective action proposals. These forms reduce the number of reports that owners and operators need to submit and that the state needs to review. A standard format also makes it easier for state officials to review the reports and for owners and operators to prepare them correctly the first time.

The Texas Water Commission is testing an automated corrective action tracking and expert advisor system that accepts site data from computer disk files. This system will both eliminate the need for owners, operators, consultants, and contractors to submit data to the state in a paper format and ensure that the data submitted are in the approved format. This system should reduce the amount of time that state site managers need to spend reviewing and approving site investigation and corrective action plans; therefore, it should expedite the number of cleanups being implemented.

New Mexico requires that the data needed for ranking a site be submitted within 7 days of discovery, as opposed to the federal reporting requirement of 45 days for submitting data on initial site characterization. This enables the state to speed up the process of ranking a site and initiating site cleanup.

North Carolina decreased the number of days owners/operators wait for payment from the State Fund from 98 days to 54 days, and the state intends to reduce this time to 30 days. The state streamlined the process by developing standard forms and a fee schedule of reimbursable cleanup activities and costs. Then, it conducted workshops across the state to train contractors in the new payment procedures. State officials note that North Carolina has paid more cleanup costs in 1992 than in the previous two years. Faster reimbursements are providing an incentive for timely cleanups. North Carolina is currently working on site assessment and corrective action guidance as well.

### **Streamlining Corrective Action Procedures**

Some states (e.g., Connecticut, Delaware, Kansas) have streamlined their processes by producing maps showing groundwater use and sensitivity. The cleanup regulations and guidances for these states are keyed to the mapped groundwater classification zones. This approach helps states make quick, site-specific decisions, and reduces reporting burdens by using existing data (i.e., maps) that can be accessed very quickly.

New Mexico sets priorities for free-product removal actions based on the extent of the free-product contamination. ("Free product" is the term for petroleum that is on the surface of the water or between the particles of the soil and is generally accessible for removal or treatment.) New Mexico limits free-product removal actions to sites where the free-product accumulation is thicker than one inch. When free product is less than one inch thick, however, New Mexico requires that it be addressed as part of an overall groundwater corrective action plan. The state established this policy after it determined that its subsoils have a high clay content that tends to limit the migration of free product. The state also determined that common free-product removal technologies would not be highly effective at such sites and could even cause the spread of contamination to the subsoil. Therefore, the state decided that remediation for sites with less than one inch of free product requires a comprehensive corrective action plan, that was more practicable, protective, and cost effective.

Connecticut requires site-specific corrective action plans for only those sites for which it has issued a notice of violation for groundwater contamination. Sites with groundwater contamination are more complicated to remediate than sites with soil contamination and require more extensive analysis to determine the appropriate remediation approach. Soil cleanups tend to be more routine; if they are initiated immediately, they can reduce the likelihood that contamination will spread to groundwater.

Ohio has proposed a rule change that would allow a monitoring-only alternative for sites where migration of the contaminant is unlikely, but the contamination could move and become a threat to human health and the environment. For example, a monitoring-only option could be used if the groundwater is not suitable now or in the foreseeable future for drinking or human contact. This option protects human health and the environment and allows state officials to focus on higher priority sites.

As sites are submitted, the Kansas Trust Fund program either lists them as high ranking sites or groups them into packages of 10 or more lower ranking sites. (Sites that meet the conditions listed in the federal technical regulations for conducting site investigations are placed on the list of high ranking sites.) Kansas immediately initiates site investigations and/or remediations at its high ranking sites. Monitoring occurs on two to three groups of sites per month on the lower ranking sites. This ranking allows Kansas to focus its resources on sites that are actually presenting a risk, to consistently reduce the backlog of lower risk sites, and to maintain cost controls by working on a volume basis.

The Missouri program developed guidance documents that explained state requirements and provided standard forms to submit the required site data. Since the guidance was distributed, average contractor costs of producing tank closure reports have dropped from \$3000 to \$300.

After four years of streamlining, the Tennessee UST program has reduced the average time for contractors to design a site cleanup from almost two years to four months. The increased quality and timeliness of contractor submissions has resulted in a savings to the state of approximately 9,000 hours or 4.3 full-time positions per year. Other improvements have included improving communication with field office staff, developing improved guidance for corrective action plans, standardizing correspondence, and reducing reporting requirements on low-risk sites.

### **Benefits Of Streamlining**

These early successes have confirmed that EPA's approach to addressing the cleanup backlog can work. A few state programs have worked aggressively at streamlining for several years and have demonstrated that it is possible to provide effective oversight at a large number of sites while reducing paperwork. Some programs are making promising revisions to their corrective action processes that allow simple cleanups at low-risk sites to proceed more quickly with better guidance and reduced oversight. Many states have reaped benefits from communicating and working more effectively with their "suppliers and customers"—contractors, consultants, tank owners and operators, and the general public. However, even in the most advanced programs, additional improvements are possible and necessary in order to meet the program's goals with the resources that are likely to be available.

### **CONCLUSIONS**

As discussed earlier in this document, on a national basis, confirmed releases are being reported to implementing agencies at a rate of about 1,000 per week; at the state level, individual site managers are overseeing up to 400 cases at a time. The number of confirmed releases is expected to level off at about 320,000 releases during fiscal year 1995. (EPA estimates that about twenty percent of the regulated universe of 1.6 million USTs is leaking.) The rate of confirmed releases is expected

to slow after December 22, 1993, the date by which all UST owners and operators must have installed release detection systems. With current resources, states and responsible parties are initiating cleanups at about 36,000 sites per year and completing cleanups at about 16,000 sites per year.

Although streamlining efforts have been effective at improving corrective action processes and increasing the number of cleanups underway, it will be increasingly difficult to keep up with the growth of confirmed releases. Cleanups are expected to become more difficult as states start remediating the more complicated and expensive groundwater sites. The majority of cleanups that have already been completed are sites at which the soil (and not the groundwater) had been contaminated. Cleanups at soil-contaminated sites are easier, less time consuming, and less costly to complete than cleanups at groundwater-contaminated sites.

Because contamination may spread in the interim, delays in approving site cleanup work can substantially increase the costs of cleanups. Added delays can also disrupt businesses for longer than necessary, making cleanups more burdensome for many owners and operators, especially small businesses.

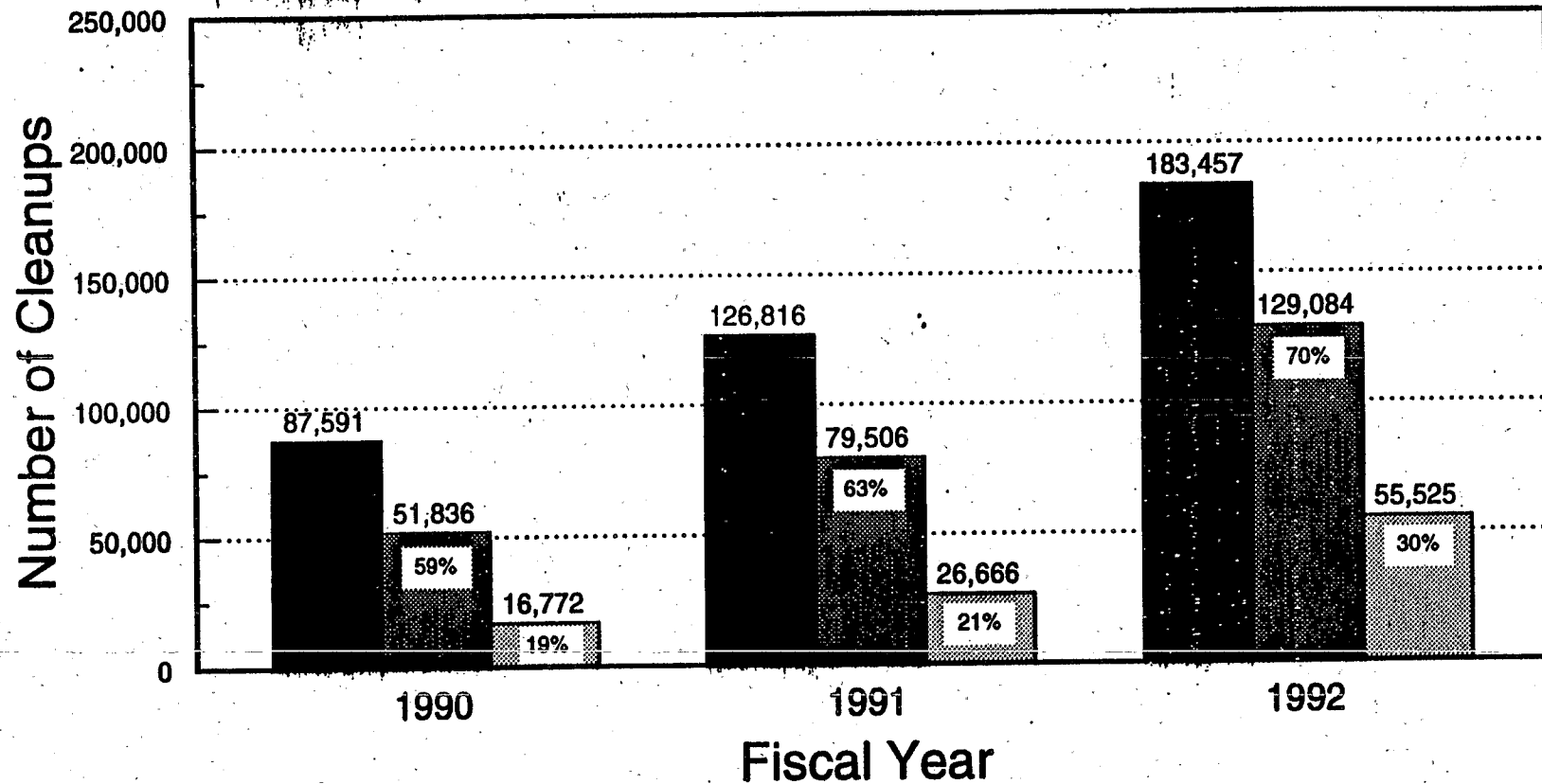
To address some of these concerns, one of OUST's top priorities will continue to be streamlining corrective action processes and promoting innovative site investigation and cleanup technologies. OUST will continue both to encourage state managers and staff to use Total Quality Management (TQM) techniques to help them identify delays and opportunities for improvement as well as to provide assistance to states as they modify their procedures or seek ways to improve performance in the field. The UST program will continue to promote the use of innovative site assessment and cleanup technologies in cooperative efforts with contractors, consultants, tank owners and operators, and state and local implementing agencies. The UST program will continue to provide financial incentives for states to reduce administrative delays in completing cleanups.

It is also essential for the UST program to focus on prevention activities to prevent future releases from occurring and to detect ongoing releases as early as possible. Detecting releases at an early stage can minimize the spread of contamination, allow for early initiation and completion of cleanups, and reduce the costs of cleanups. Consequently, enforcement of the technical requirements of the prevention program will continue to be a priority for the UST program. Enforcement efforts will include: Developing a federal field citation capability in each region; focusing federal enforcement on states with low enforcement activity; providing training and conducting joint inspections to upgrade state inspector capability; and encouraging states to use non-traditional, low-cost compliance tools such as field citations, compliance mailings, and making release detection compliance a condition of receiving state funds for cleanup.

Because a crucial component of the federal UST program is the approval of state programs, EPA's regions will continue to provide assistance to strengthen state programs, help streamline the state program approval (SPA) process, and facilitate amending state regulations. The Agency will continue to use Trust Fund monies as an incentive for obtaining SPA by awarding states that have obtained (or are close to obtaining) state program approval. The majority of the states are expected to have their programs approved by the end of Fiscal Year 1995.

## Exhibit 1

### Program Trends in the Number of Confirmed Releases, Cleanups Initiated, and Cleanups Completed

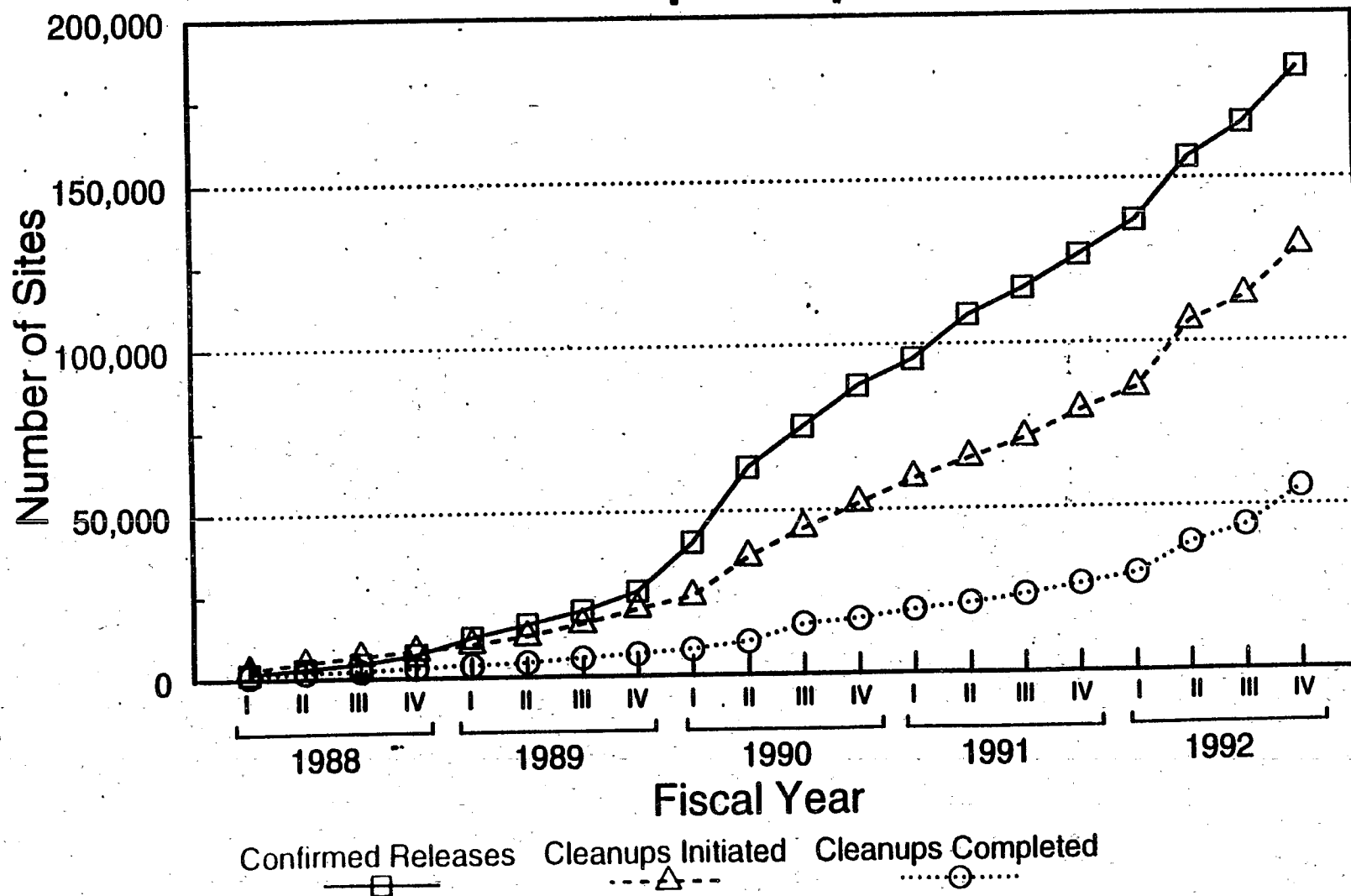


■ Confirmed Releases ■ Cleanups Initiated ■ Cleanups Completed

Percentages shown indicate the number of cleanups initiated and completed relative to the number of confirmed releases. Cleanups completed are a subset of cleanups initiated. All numbers are cumulative to date.

## Exhibit 2

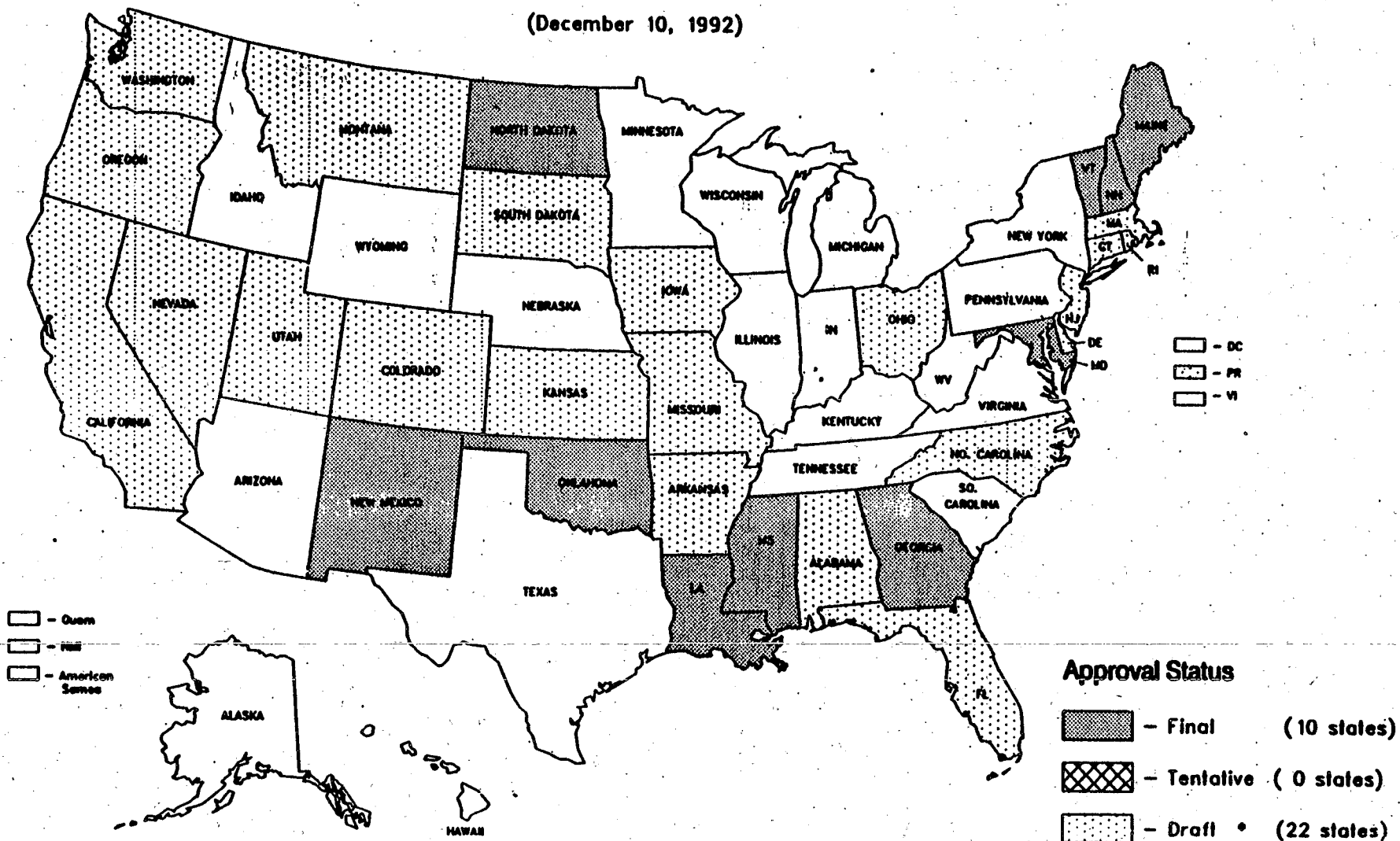
### Growth Rate of Confirmed Releases, Cleanups Initiated, and Cleanups Completed



Cleanups completed are a subset of cleanups initiated. All numbers are cumulative to date.

## UST State Program Approval Status

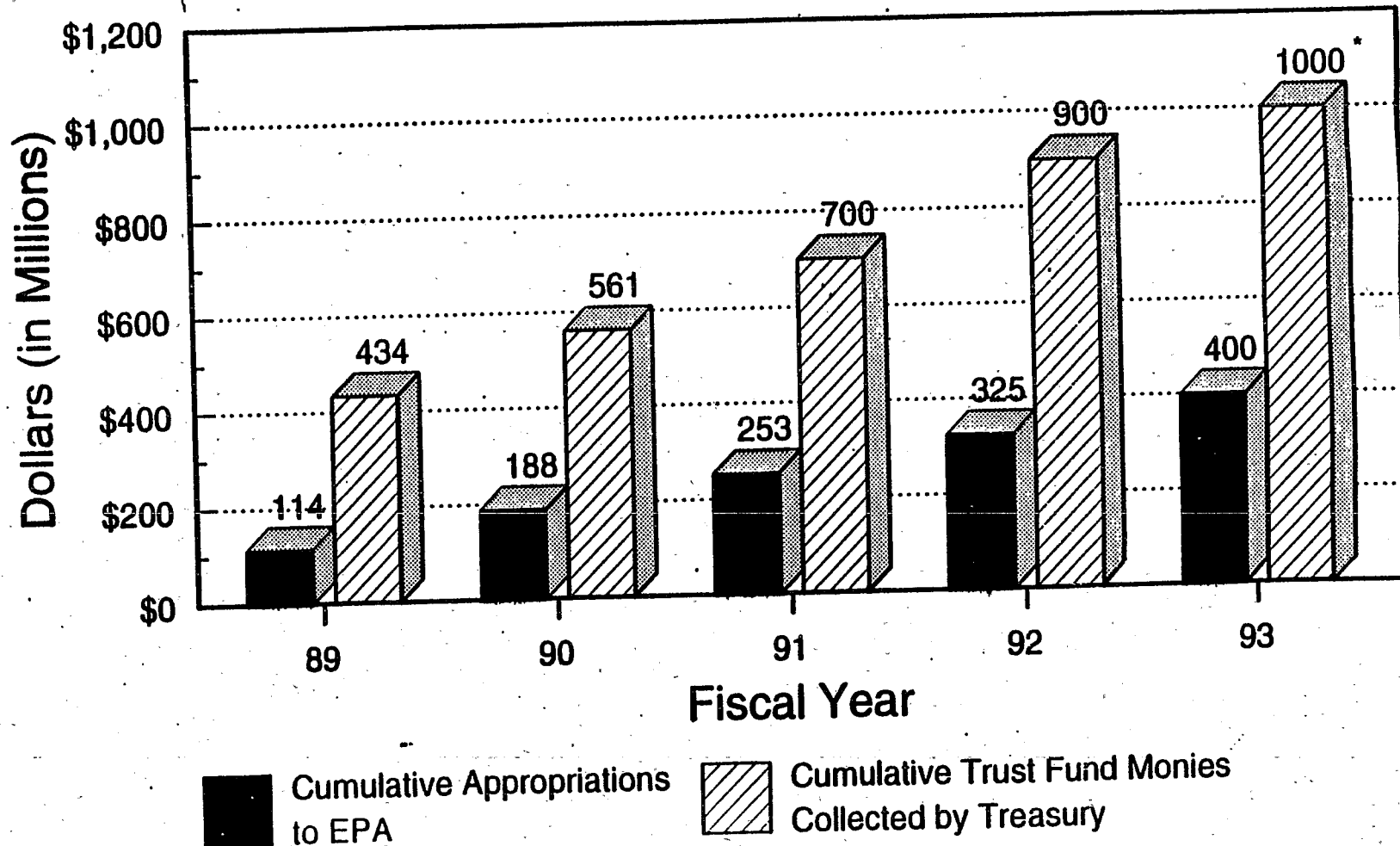
(December 10, 1992)



• Not shown where the State has either submitted a complete or nearly complete SPA application.

## Exhibit 4

### Cumulative Appropriations to EPA Versus Cumulative Money Collected in the LUST Trust Fund

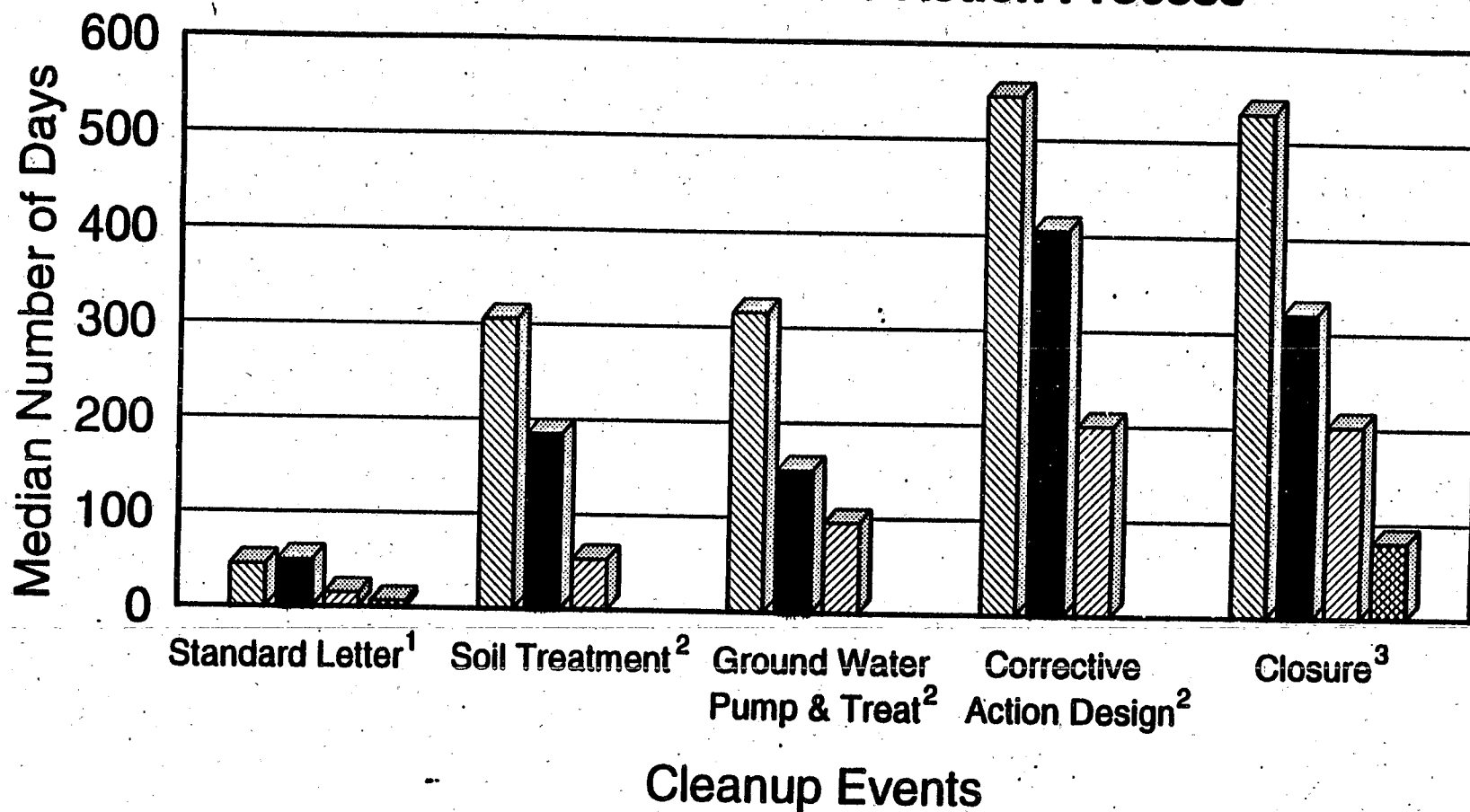


\*projected



# Exhibit 5

## Time Required to Complete Various Stages of Minnesota's UST Corrective Action Process



<sup>1</sup> Sent to owners/operators to require initiation of cleanup.

<sup>2</sup> Insufficient sample size to determine median duration in 1991.

<sup>3</sup> Closure indicates that no further action is currently required at the site. Low 1991 median partially attributable to high percentage of soil-only sites.

